

# PATENT ABSTRACTS OF JAPAN

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(71)Applicant : MAZDA MOTOR CORP

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(72)Inventor : OGASAWARA TOSHIFUMI

KAMESAKO YUUSUKE

KANDA TERUO

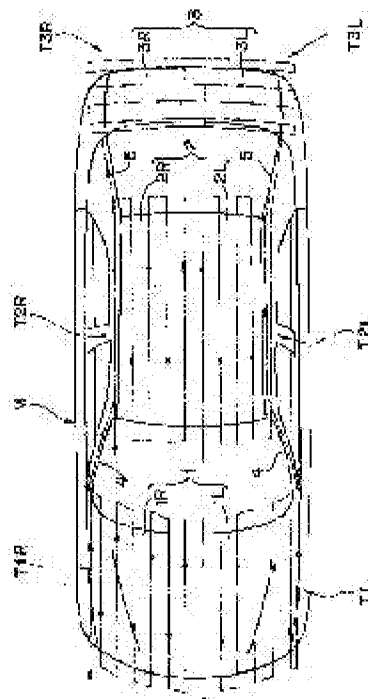
SAKOTA TOSHIYUKI

## (54) METHOD AND APPARATUS FOR COATING BY A PLURALITY OF COATERS

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a method and apparatus for coating by a plurality of coatiers, in which film thickness in a coated part in a return part in each coating trajectory is prevented from becoming unstable and thicker than other parts in each coating area plotted beforehand in a plurality of areas by using a plurality of coatiers having reciprocating coating-trajectories in predetermined directions.

**SOLUTION:** In this coating method, respective coating areas 1L-3L, 1R-3R plotted beforehand in a plurality of ares in a vehicle body are coated by a plurality of coating robots. The robots lay down coating trajectories T1L-T3L, T1R-T3R reciprocating in predetermined directions relative to a transfer direction of a vehicle body M. Speeds of reciprocating motions in the intermediate area in coating trajectories are set almost equal, and times for their coating operations coincide at least partly. In the coating, each robot suspends coating- material discharge in the return part of the trajectories, and the coating is carried out so as to joint the coating parts in the intermediate area of each coating trajectory.



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- 2.\*\*\*\* shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the coating method by two or more coating machines, and its device.

[0002]

[Description of the Prior Art]As everyone knows, when painting to comparatively large-sized coated objects, such as the body of a car, distinguishing the coating area of a coated object by different color with using two or more coating machines is performed. For example, he forms the coating machine in both sides of body transportation lines, respectively, and is trying to distinguish the left part and right portion of the body with these each coating machine generally in the case of the body of a car. It is also common to form two or more coating machines in both sides of body transportation lines along a transportation direction, respectively.

[0003]Thus, he is trying to obtain uniform coat thickness as much as possible over the whole coating area of the coating machine concerned by spraying a paint, when painting using a coating machine, making a coating gun reciprocate to a determined direction to the direction of relative displacement with a coated object. For example, it faces painting the car body side of a car, a painted part (car body side) is divided to two or more coating areas, and the method of painting by making a coating gun reciprocate in the direction (abbreviated height direction) which abbreviated-intersects perpendicularly to a body transportation direction is indicated by JP,7-265757,A for every coating area.

[0004]

[Problem(s) to be Solved by the Invention]When painting by making a coating gun reciprocate as mentioned above, as typically shown in drawing 7, about the staging area a except the clinch portion b of both ends, can maintain to approximately regulated movement speed among the coating locus, but. About the above-mentioned clinch portion b, with the clinch operation, unescapable, the movement speed of a coating gun will fall and will be destabilized.

[0005]Namely, since movement speed changes so that may slow it down if a coating gun comes to the

portion b by return from the staging area a, and it may become speed zero (0: zero) at the clinch end, it may accelerate from there and it may go into the staging area a again, In the above-mentioned clinch portion b, the movement speed of a coating gun falls and will become unstable. Therefore, generally in the clinch portion b of this coating locus, coating film thickness will become unstable thickly as compared with the staging area a.

[0006]When at least a part of paint operating time paints especially each coating area on the coated object beforehand divided to two or more fields using two or more coating machines which overlap mutually, as the coating locus of each coating machine is connected, paint is performed, but. Change of the above coating film thickness will arise into the paint portion equivalent to each clinch part of the coating locus of each coating machine.

[0007]As especially typically shown in drawing 8, when painting the coating area d1 and d2 which adjoin mutually about the reciprocating direction of a coating gun, respectively, in both the coating areas d1 and the boundary part of d2, the clinch portion b1 of the moving track of both coating guns and b2 will adjoin. Therefore, as typically shown in drawing 9, by this boundary part, there was a problem that it became what has unstable coating film thickness, and the thickness of the coat Fp became thick too much as compared with each staging area a1 and a2, especially.

[0008]When painting making a coating gun reciprocate, as shown in drawing 7 and drawing 8, Instead of moving a coating gun to what is called zigzag shape, it is known by making it move along with the pattern of approximately rectangular shape that much more uniform coating film thickness will be obtained so that the distance between adjacent loci may become uniform.

[0009]This invention was made in view of the above-mentioned technical technical problem, and uses two or more coating machines which have a coating locus which reciprocates to a determined direction, It faces painting each coating area on the coated object beforehand divided to two or more fields, respectively, and aims at preventing the coating film thickness of the paint portion equivalent to the clinch portion of each coating locus destabilizing, and becoming thick as compared with other portions.

[0010]

[Means for Solving the Problem]For this reason, a coating method by two or more coating machines concerning an invention (henceforth the 1st invention) of this application claim 1, While having a coating locus which reciprocates to a determined direction to the direction of relative displacement with a coated object, Reciprocation speed of a staging area except a clinch portion of both ends is set as approximately uniform velocity among these coating loci, and at least a part of paint operating time with two or more coating machines which overlap mutually. It is a coating method which paints each coating area on the above-mentioned coated object beforehand divided to two or more fields, injection of a paint is stopped in a clinch part of a coating locus about each above-mentioned coating machine, and it paints by [ as connecting a paint portion by a staging area of each coating locus ].

[0011]An invention (henceforth the 2nd invention) concerning claim 2 of this application, In the 1st above-mentioned invention, movement speed in alignment with each coating locus and each coating locus is set

up identically [ abbreviation ] about each coating machine which paints a coating area which adjoins mutually, respectively, and paint start timing to each coating area is set up identically [ abbreviation ].

[0012]An invention (henceforth the 3rd invention) concerning claim 3 of this application paints a coating area where each above-mentioned coating machine adjoins mutually about the above-mentioned reciprocating direction in the 2nd above-mentioned invention.

[0013]an invention (henceforth the 4th invention) concerning claim 4 of this application -- the [ above-mentioned ] -- distance between loci which a coating locus of at least some coating machines adjoins in the 1st invention -- abbreviated -- a uniform rectangular pattern part is included

[0014]A coating device concerning an invention (henceforth the 5th invention) of claim 5 of this application, A coating gun which has a coating locus which reciprocates to a determined direction to the direction of relative displacement with a coated object, With two or more coating machines with which are provided with a reciprocation control means which controls a coating gun so that reciprocation speed of a staging area except a clinch portion of both ends may serve as approximately uniform velocity among coating loci of this coating gun, and at least a part of paint operating time overlaps mutually. It is a coating device which paints each coating area on the above-mentioned coated object beforehand divided to two or more fields, A paint control means which stops injection of a paint in a clinch part of a coating locus, and paints by [ as connecting a paint portion by a staging area of each coating locus ] about each above-mentioned coating machine was established.

[0015]An invention (henceforth the 6th invention) concerning claim 6 of this application, the [ above-mentioned ] -- movement speed which met each coating locus and each coating locus about each coating machine which paints a coating area which adjoins mutually in the 5th invention, respectively -- abbreviated -- paint start timing [ as opposed to / it is set up identically and / each coating area ] -- abbreviated -- it is set up identically

[0016]An invention (henceforth the 7th invention) concerning claim 7 of this application paints a coating area where each above-mentioned coating machine adjoins mutually about the above-mentioned reciprocating direction in the 6th above-mentioned invention.

[0017]distance between loci which a coating locus of at least some coating machines adjoins in the 5th above-mentioned invention in an invention (henceforth the 8th invention) concerning claim 8 of this application -- abbreviated -- a uniform rectangular pattern part is included

[0018]

[Embodiment of the Invention]The case where an embodiment of the invention is applied to paint of the body of a car is hereafter taken for an example, and it explains in detail, referring to an accompanying drawing. Drawing 1 is a perspective view showing the outline of body paint station PS of the car concerning this embodiment. As shown in this figure, in this body paint station PS, finish coating is performed from both sides of a transportation direction to the body M which is put on the cart Cm and conveyed to a determined direction (from the diagonal right in drawing 1 to the direction of the diagonal below).

[0019]In this paint station PS, painting-robot BL as a coating machine and BR, In both sides of a

transportation direction, every three sets each are allocated along the transportation direction, and, in the left-hand side robot BL, right-hand side robot BR paints [ left part / of the body M ] about a right portion, respectively.

[0020]Although not specifically illustrated, In the control box of each robots BL and BR, For example, the controller constituted as the principal part is stored in the microcomputer, and setting out and control of the coating locus of every [ of each robots BL and BR ] coating gun G, the movement speed of the reciprocation operation, paint start timing, etc. are performed by this controller. The controller of these each painting-robot BL and BR is equivalent to the "reciprocation control means" and the "paint control means" which were indicated to this application claim.

[0021]Namely, if the body M of the bonnet 1, the roof 2, and trunk lid 3 grade mainly concerns and paint of an upper surface portion is explained, as shown in drawing 2, the coating area of this flat part, It is divided mainly to the bonnet 1, the roof 2, and a total of six field of each left parts 1L, 2L, and 3L of the trunk lid 3, and each right portions 1R, 2R, and 3R, About each of these left parts 1L, 2L, and 3L, each left-hand side robot BL paints, and each right-hand side robot BR paints about each right portions 1R, 2R, and 3R. Each upper surface portion of the front pillar 4 and the rear pillar 5 is also painted at a series of processes.

[0022]He is trying to paint in this embodiment, facing painting respectively to each section areas 1L-3L, 1R-3R, and making coating gun G of each robots BL and BR reciprocate to a determined direction (getting it blocked reciprocating operation). namely, coating-locus \*\* which makes coating gun G reciprocate in the direction (cross direction of the body M) parallel to a body transportation direction about each section areas 1L, 2L, 1R, and 2R of the bonnet 1 and the roof 2 -- 1L and \*\* -- 2L and \*\* -- 1R and \*\* -- paint is performed according to 2R. coating-locus \*\* which makes coating gun G reciprocate in the direction (cross direction) which intersects perpendicularly to a body transportation direction about the section areas 3L and 3R of the right and left of the trunk lid 3 on the other hand -- 3L and \*\* -- paint is performed according to 3R.

[0023]moreover -- this embodiment -- each above-mentioned coating-locus \*\*1L-\*\* -- 3L and \*\*1R-\*\* -- the distance between the loci which each reciprocation pattern of 3R adjoins -- abbreviated -- it is set up form the pattern of a uniform approximately rectangle. In this rectangular shape pattern, each clinch portion is making the approximately U shape.

[0024]thus, the distance between adjacent loci -- abbreviated -- as compared with the case of a zigzag shape pattern (refer to drawing 7 and drawing 8), coating film thickness becomes uniform by considering it as a uniform rectangular pattern. That is, equalization of coating film thickness can be promoted more with comparatively easy composition. According to this embodiment, since the painting robot which can perform easily and individually setting out and control of the coating locus of coating gun G, movement speed, etc. was used as a coating machine, the paint according to the above rectangular shape patterns is easily realizable.

[0025]It faces painting respectively to each above-mentioned section areas 1L-3L, 1R-3R, About each painting-robot BL of the right and left which paint the section areas 1L-3L, 1R-3R of the right and left which adjoin mutually, respectively, and BR. each coating-locus \*\*1L-\*\* -- 3L and \*\*1R-\*\* -- 3R and each coating-

locus \*\*1L-\*\* -- 3L and \*\*1R-\*\* -- the movement speed in alignment with 3R -- abbreviated -- paint start timing [ as opposed to / it is set up identically and / each section areas 1L-3L, 1R-3R ] -- abbreviated -- it is set up identically. By setting up in this way, it can prevent that coating gun G of each painting-robot BL on either side and BR interferes certainly [ are comparatively easy composition and ].

[0026]coating-locus \*\* which makes coating gun G reciprocate in the direction (cross direction) which intersects perpendicularly to a body transportation direction especially about both the section areas 3L and 3R of the right and left of the trunk lid 3 -- 3L and \*\* -- paint is performed according to 3R. That is, although the section area which interference of coating gun G generally tends to produce and which adjoins mutually about a reciprocating direction will be painted, interference of coating gun G of painting-robot BL on either side and BR can be prevented certainly [ are comparatively easy composition and ] also by this case.

[0027]It faces painting respectively to each above-mentioned section areas 1L-3L, 1R-3R so that drawing 2 may show well in this embodiment, each painting-robot BL and BR -- coating-locus \*\*1L-\*\* of coating gun G -- 3L and \*\*1R-\*\* -- the both ends of 3R are extended, respectively to the portion exceeding the corresponding section areas 1L-3L, 1R-3R, and are set up turn up at the end of each of this extension. that is, this case -- each coating-locus \*\*1L-\*\* -- 3L and \*\*1R-\*\* -- the clinch portion of 3R is located in the outside of the section areas 1L-3L, 1R-3R for which paint is needed.

[0028]each coating-locus \*\*1L-\*\* -- 3L and \*\*1R-\*\* -- about the staging area except the clinch portion of the both ends of 3R. the paint portion corresponding to [ reciprocation speed (movement speed) is set to every / of each painting-robot BL and BR / coating gun G at approximately uniform velocity, therefore ] this staging area -- abbreviated -- uniform coating film thickness can be obtained. The staging area approximately regulated in this movement speed covers each corresponding whole section areas 1L-3L, 1R-3R respectively to be painted about each painting-robot BL and BR, respectively.

[0029]and -- each painting-robot BL and BR -- each coating-locus \*\*1L-\*\* -- 3L and \*\*1R-\*\* -- injection of a paint in the clinch portion of the both ends of 3R, [ stop and ] each coating-locus \*\*1L-\*\* -- 3L and \*\*1R-\*\* -- it is set up so that paint may be performed, as the paint portion by the staging area of 3R is connected.

[0030]Therefore, a coat is formed only about the portion corresponding to the staging area which becomes the movement speed of coating gun G is constant, and uniform [ coating film thickness ] about each painting-robot BL and BR, It is lost in the clinch part from which it originates in the movement speed of coating gun G falling and destabilizing, and thickness becomes it is too thick and uneven that a coat is formed. and each coating-locus \*\*1L-\*\* -- 3L and \*\*1R-\*\* -- since paint is performed as the paint portion by the staging area of 3R is connected, the paint with coat thickness uniform as a whole can be performed.

[0031]The case where the section areas 3L and 3R of the right and left of the trunk lid 3 painted by painting-robot BL of right and left [ the section area which adjoins the above coating method mutually about the reciprocating direction of coating gun G ], and BR are painted is taken for an example, and it explains in detail. coating-locus [ at the time of drawing 3 painting the left-hand side section area 3L of the trunk lid 3 upper surface of the above-mentioned body M ] \*\* -- the explanatory view showing 3L. coating-locus [ at

the time of drawing 4 painting the right-hand side section area 3R of the trunk lid 3 above-mentioned upper surface ] \*\* -- the explanatory view showing 3R and drawing 5 are the explanatory views showing the coating locus on the above-mentioned whole upper surface of trunk lid 3.

[0032]As shown in drawing 3 and drawing 4, about each section areas 3L and 3R of the left-hand side of the trunk lid 3 upper surface, and right-hand side. each coating-locus [ of painting-robot BL of left-hand side and right-hand side, and coating gun G of BR ] \*\* -- 3L and \*\* -- the both ends of 3R are extended to the portion exceeding the corresponding section areas 3L and 3R, respectively, and are set up turn up at the end of each of this extension. that is, this case -- each coating-locus \*\* -- 3L and \*\* -- the clinch portion B1 of 3R and B-2 are located in the outside of the section areas 3L and 3R for which paint is needed.

[0033]each coating-locus \*\* -- 3L and \*\* -- about the staging area A1 except the clinch portion of the both ends of 3R, and A2. the paint portion corresponding to [ reciprocation speed (movement speed) is set to every / of each painting-robot BL and BR / coating gun G at approximately uniform velocity, therefore ] this staging area A1 and A2 -- abbreviated -- uniform coating film thickness can be obtained. The staging area A1 approximately regulated in this movement speed and A2 cover each corresponding whole section areas 3L and 3R respectively to be painted about each painting-robot BL and BR, respectively.

[0034]and -- each painting-robot BL and BR -- each coating-locus \*\* -- 3L and \*\* -- in the clinch portion B1 of the both ends of 3R, and B-2, it is set up so that injection of a paint may be stopped. it is shown in drawing 5 -- as -- each coating-locus \*\* -- 3L and \*\* -- it is alike and is set up so that paint may be performed, as the staging area A1 of 3R and the paint portion by A2 are smoothly connected by the boundary part of both the section areas 3L and 3R. The paint with uniform coat thickness can be performed about the whole section areas 3L and 3R which adjoin mutually about the reciprocating direction of coating gun G as mentioned above.

[0035]When painting respectively to each section areas 3L and 3R of the right and left which adjoin above-mentioned each other so that drawing 3 may be compared with drawing 4 and it may understand, About each painting-robot BL of the right and left which paint these each section areas 3L and 3R, respectively, and BR. each coating-locus \*\* -- 3L and \*\* -- 3R and each coating-locus \*\* -- 3L and \*\* -- the movement speed in alignment with 3R -- abbreviated -- it being set up identically and, And the paint start timing to each section areas 3L and 3R is set up identically [ abbreviation ], and since the coating gun G of each painting-robot BL on either side and BR operates synchronously, interfering mutually is prevented certainly.

[0036]an above embodiment -- coating-locus \*\*1L-\*\* of each painting-robot BL and BR \*\* -- 3L and \*\*1R-\*\* -- all 3R, although it comprised an abbreviation rectangular shape pattern, The distance between the loci which instead adjoin each other is not uniform, and it may be made to constitute from what is called a zigzag shape pattern that makes predetermined triangular shape.

[0037]Namely, if it explains taking the case of the case where the section area which adjoins mutually about the reciprocating direction of a coating gun is painted, for example, coating-locus [ of the right and left which have a zigzag shape pattern on either side as shown in drawing 6 ] \*\* -- 9L and \*\* -- injection of a

paint by the clinch portion B7 of an end, and B8 about 9R, [ stop and ] each coating-locus \*\* -- 9L and \*\* -- what is necessary is just to paint them by the boundary part of both the section areas 9L and 9R, as the staging area A7 of 9R and the paint portion by A8 are connected smoothly the whole section areas 9L and 9R which adjoin mutually about the reciprocating direction (longitudinal direction in drawing 6) of a coating gun by this -- abbreviated -- it becomes possible to obtain uniform coat thickness.

[0038]Like the section areas 1L and 1R of the right and left of the bonnet 1 upper surface of the body M, or the section areas 2L and 2R of the right and left of the roof 2 upper surface, Since the coating loci of the section area of adjoining right and left are abbreviated parallel mutually when the section area which adjoins mutually about the direction which intersects perpendicularly to the reciprocating direction of coating gun G is painted by painting-robot BL on either side and BR, respectively, Although the staging area itself is not connected by the boundary part of both section areas, as the parallel paint portions in alignment with this coating locus are smoothly connected by the boundary part of a section area, paint is performed by setting up appropriately the interval of the coating locus which sandwiches this boundary part.

[0039]Although the painting robot was used for an above embodiment as a coating machine, This invention is effectively applicable also to the case where what is called an automatic machine (automatic coating machine) that is not limited in this case and is generally used instead of a painting robot at the usual paint station is used. Thus, in the range which this invention is not limited to the above embodiment and does not deviate from the gist, it cannot be overemphasized that various improvement or a design change is possible.

[0040]

[Effect of the Invention]According to the coating method concerning the invention of the 1st of this application, two or more coating machines which have a coating locus which reciprocates to a determined direction are used, Since it faces painting each coating area on the coated object beforehand divided to two or more fields, respectively and was made to stop injection of a paint in the clinch part of a coating locus about each coating machine, It is lost in the clinch part from which a coat is formed only about the portion corresponding to the staging area which becomes the movement speed of a coating machine is constant and uniform [ coating film thickness ] about each coating machine, it originates in the movement speed of a coating machine falling and destabilizing, and thickness becomes it is too thick and uneven that a coat is formed. And since paint is performed as the paint portion by the staging area of each coating locus is connected, the paint with coat thickness uniform as a whole can be performed.

[0041]According to the invention of the 2nd of this application, fundamentally, the same effect as the 1st above-mentioned invention can be done so. Especially about each coating machine which paints the coating area which adjoins mutually, respectively. Since the movement speed in alignment with each coating locus and each coating locus is set up identically [ abbreviation ] and the paint start timing to each coating area is set up identically [ abbreviation ], interference of both the above-mentioned coating machines can be prevented certainly [ are comparatively easy composition and ].



[0042]According to the invention of the 3rd of this application, fundamentally, the same effect as the 2nd above-mentioned invention can be done so. It faces painting the coating area interference of coating machines is generally especially apt to produce and which adjoins mutually about a reciprocating direction, and interference of both the above-mentioned coating machines can be prevented certainly [ are comparatively easy composition and ].

[0043]According to the invention of the 4th of this application, fundamentally, the same effect as the 1st above-mentioned invention can be done so. the distance between the loci which especially the coating locus of at least some coating machines adjoins -- abbreviated -- by including the uniform rectangular pattern part, it is comparatively easy composition and equalization of coating film thickness can be promoted more.

[0044]According to the coating device concerning the invention of the 5th of this application, two or more coating machines which have a coating locus which reciprocates to a determined direction are used, Since it faces painting each coating area on the coated object beforehand divided to two or more fields, respectively, a paint control means is established and it was made to stop injection of a paint in the clinch part of a coating locus about each coating machine, It is lost in the clinch part from which a coat is formed only about the portion corresponding to the staging area which becomes the movement speed of a coating machine is constant and uniform [ coating film thickness ] about each coating machine, it originates in the movement speed of a coating machine falling and destabilizing, and thickness becomes it is too thick and uneven that a coat is formed. And since paint is performed as the paint portion by the staging area of each coating locus is connected, the paint with coat thickness uniform as a whole can be performed.

[0045]According to the invention of the 6th of this application, fundamentally, the same effect as the 5th above-mentioned invention can be done so. Especially about each coating machine which paints the coating area which adjoins mutually, respectively. Since the movement speed in alignment with each coating locus and each coating locus is set up identically [ abbreviation ] and the paint start timing to each coating area is set up identically [ abbreviation ], interference of both the above-mentioned coating machines can be prevented certainly [ are comparatively easy composition and ].

[0046]According to the invention of the 7th of this application, fundamentally, the same effect as the 6th above-mentioned invention can be done so. It faces painting the coating area interference of coating machines is generally especially apt to produce and which adjoins mutually about a reciprocating direction, and interference of both the above-mentioned coating machines can be prevented certainly [ are comparatively easy composition and ].

[0047]According to the invention of the 8th of this application, fundamentally, the same effect as the 5th above-mentioned invention can be done so. the distance between the loci which especially the coating locus of at least some coating machines adjoins -- abbreviated -- by including the uniform rectangular pattern part, it is comparatively easy composition and equalization of coating film thickness can be promoted more.

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[Translation done.]

いるので、比較的簡単な構成で、且つ、確実に、上記両塗装機どうしの干渉を防止することができる。

【0042】更に、本願の第3の発明によれば、基本的には、上記第2の発明と同様の効果を奏することができる。特に、塗装機どうしの干渉が一般に生じ易い、往復動方向に関して互いに隣接する塗装領域を塗装するに際して、比較的簡単な構成で且つ確実に、上記両塗装機どうしの干渉を防止することができる。

【0043】また、更に、本願の第4の発明によれば、基本的には、上記第1の発明と同様の効果を奏すること  
10 ができる。特に、少なくとも一部の塗装機の塗装軌跡は、隣り合う軌跡間の距離が略均一な矩形パターン部を含んでいることにより、比較的簡単な構成で、塗装膜厚の均一化をより促進することができる。

【0044】また、更に、本願の第5の発明に係る塗装装置によれば、所定方向に往復動する塗装軌跡を有する複数の塗装機を用いて、予め複数領域に区画された被塗物上の各塗装領域をそれぞれ塗装するに際し、塗装制御手段を設けて各塗装機について塗装軌跡の折り返し部では塗料の噴射を停止するようにしたので、各塗装機につ  
20 いて、塗装機の移動速度が一定で塗装膜厚が均一となる中間領域に対応した部分についてのみ塗膜が形成され、塗装機の移動速度が低下し且つ不安定化すること起因して膜厚が過度に厚く且つ不均一となる折り返し部では塗膜が形成されることはなくなる。そして、各塗装軌跡の中間領域による塗装部分を繋ぎ合わせるようにして塗装が行われるので、全体として塗膜厚さが均一な塗装を行うことができる。

【0045】また、更に、本願の第6の発明によれば、基本的には、上記第5の発明と同様の効果を奏すること  
30 ができる。特に、互いに隣接する塗装領域をそれぞれ塗装する各塗装機について、各々の塗装軌跡および各塗装軌跡に沿った移動速度が略同一に設定され、且つ、各々の塗装領域に対する塗装開始タイミングが略同一に設定されているので、比較的簡単な構成で、且つ、確実に、上記両塗装機どうしの干渉を防止することができる。

【0046】また、更に、本願の第7の発明によれば、基本的には、上記第6の発明と同様の効果を奏すること  
30 ができる。特に、塗装機どうしの干渉が一般に生じ易

い、往復動方向に関して互いに隣接する塗装領域を塗装するに際して、比較的簡単な構成で且つ確実に、上記両塗装機どうしの干渉を防止することができる。

【0047】また、更に、本願の第8の発明によれば、基本的には、上記第5の発明と同様の効果を奏することができる。特に、少なくとも一部の塗装機の塗装軌跡は、隣り合う軌跡間の距離が略均一な矩形パターン部を含んでいることにより、比較的簡単な構成で、塗装膜厚の均一化をより促進することができる。

【図面の簡単な説明】

【図1】 本発明の実施の形態に係る塗装ステーションの要部を概略的に示す斜視図である。

【図2】 上記塗装ステーションの各塗装ロボットにより車体の上面部分の塗装を行う際の各塗装軌跡を示す説明図である。

【図3】 上記車体のトランクリッド上面の左側部分の塗装を行う際の塗装軌跡を示す説明図である。

【図4】 上記トランクリッド上面の右側部分の塗装を行う際の塗装軌跡を示す説明図である。

【図5】 上記トランクリッド上面全体の塗装軌跡を示す説明図である。

【図6】 ギグザグ状パターンの塗装軌跡に沿った塗装を模式的に示す説明図である。

【図7】 従来技術に係る塗装方法による塗装軌跡の往復動パターンによる塗装を模式的に示す説明図である。

【図8】 従来技術に係る塗装方法で隣接した塗装領域を塗装する際の各塗装軌跡を示す模式的に示す説明図である。

【図9】 従来技術に係る塗装方法で隣接した塗装領域を塗装した際の塗装膜厚を模式的に示す説明図である。

【符号の説明】

1 L, 1 R, 2 L, 2 R, 3 L, 3 R, 9 L, 9 R…区画領域

A 1, A 2, A 7, A 8…(塗装軌跡の)中間領域

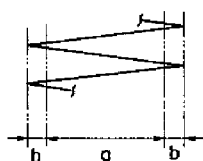
B 1, B 2, B 7, B 8…(塗装軌跡の)折り返し部分

B L, B R…塗装ロボット(塗装機)

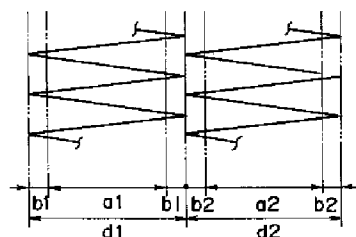
M…車体(被塗物)

T 1 L, T 1 R, T 2 L, T 2 R, T 3 L, T 3 R, T 9 L, T 9 R…塗装軌跡

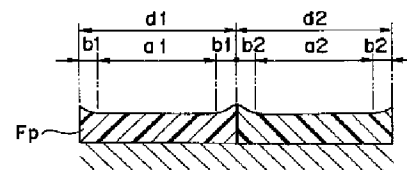
【図7】



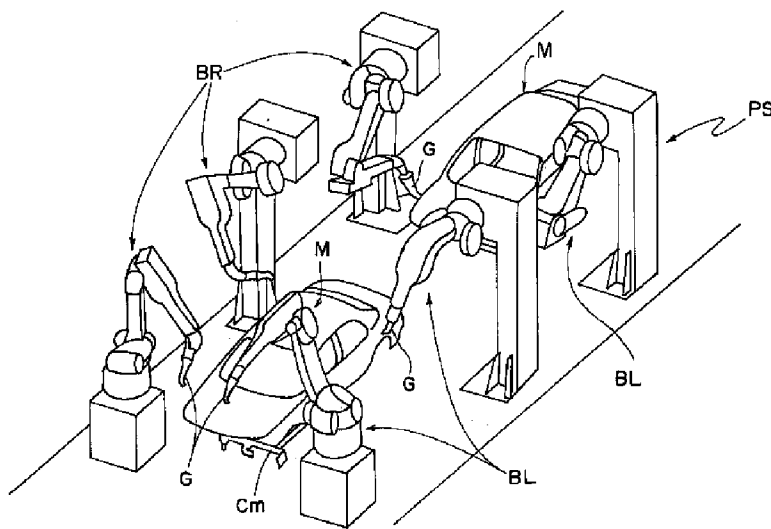
【図8】



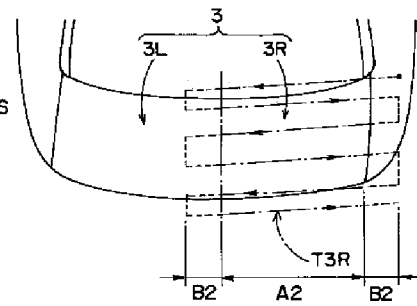
【図9】



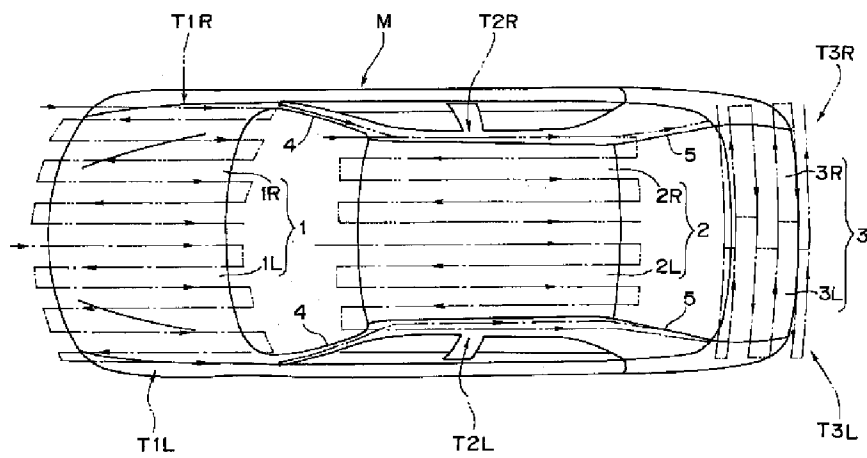
【図1】



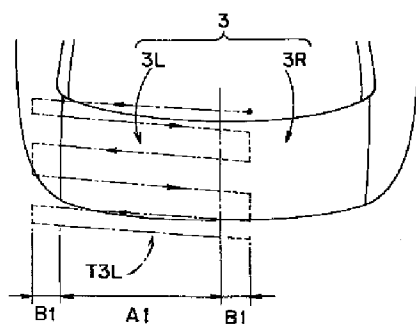
【図4】



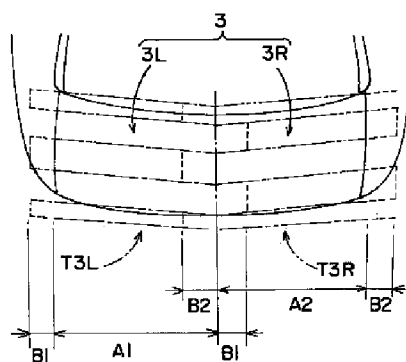
【図2】



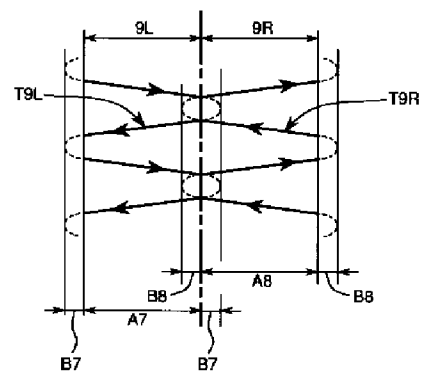
【図3】



【図5】



【図6】



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(72)発明者 神田 輝夫  
広島県安芸郡府中町新地3番1号 マツダ  
株式会社内

(72)発明者 迫田 俊之  
広島県安芸郡府中町新地3番1号 マツダ  
株式会社内

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